# Jet energy correction using weights on calorimeters readout for 20 GeV jets.

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- **All calculations were carried out with CMSIM120**

**Calorimeter geometry:**
**Barrel:** ECAL+HB1+HB2+HB3 + tailcatcher
**Endcap:** ECAL+HE1+HE2+HE3

**Calibration constants for HCAL (determined for $E_T$=50 GeV pions):**
**Barrel:** 118E5,147E5,147E5,150E5
**Endcap:** 156E5,220E5,220E5

**Energy threshold for ECAL:**
**Barrel:** $E_T$=30 MeV/crystal
**Endcap:** E=150 MeV/crystal

## ♦ CALIBRATION PROCEDURE

➨ $q\bar{q}$ were generated with **PYTHIA**
datacards: MSEL=0
MSUB(12)=1 (qqbar-qqbar)
CKIN(3)=20, CKIN(4)=30 (20-30GeV)
CKIN(13)=CKIN(15)=-0.087
CKIN(14)=CKIN(16)=0.087

➨ jets were found on generation level with simple cone algorythm (**PYCELL**)

➨ jets were found in calorimeter with modified window algorithm using default calibration coefficient.

- **minimisation of functional:**

$$S = \sqrt{\frac{\sum_{1}^{nevent} \langle E_{jet_i}^{rec} - E_{jet_i}^{gen} \rangle^2}{nevent - 1}}$$

**was performed for 20-30 GeV PTbin with $\eta$ around 0. and for cone size=0.5.**

$$E_{jet_i}^{rec} = \alpha ECAL + \sum \beta_j HB_j + \sum \gamma_j HE_j$$

⌘ **Obtained weights (only $\alpha$, $\beta_1$ and $\beta_2$ were optimized, all other weightes were fixed):**

**PTbin=20-30 GeV**

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**cone size=0.5 :** $E_T^{jet}$**max=15-25 GeV**

$E_T^{jet}$**=18.85+-4.23 GeV**

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**without calibration:** $E_T^{jet}$**=17.22+-4.45 GeV**

**with calibration:** $E_T^{jet}$**=18.87+-4.44 GeV**

$\alpha$**=1.2014,**$\beta_1$**=0.7837,** $\beta_2$**=0.8901**

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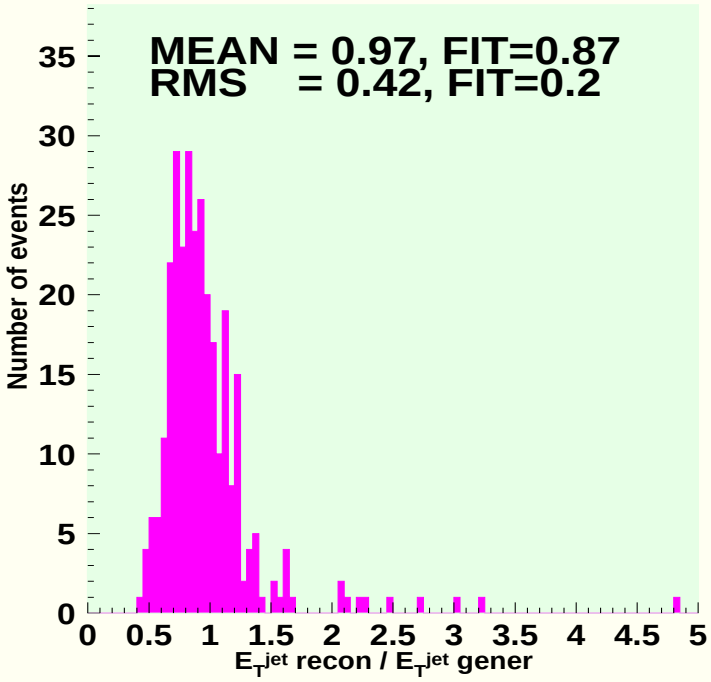
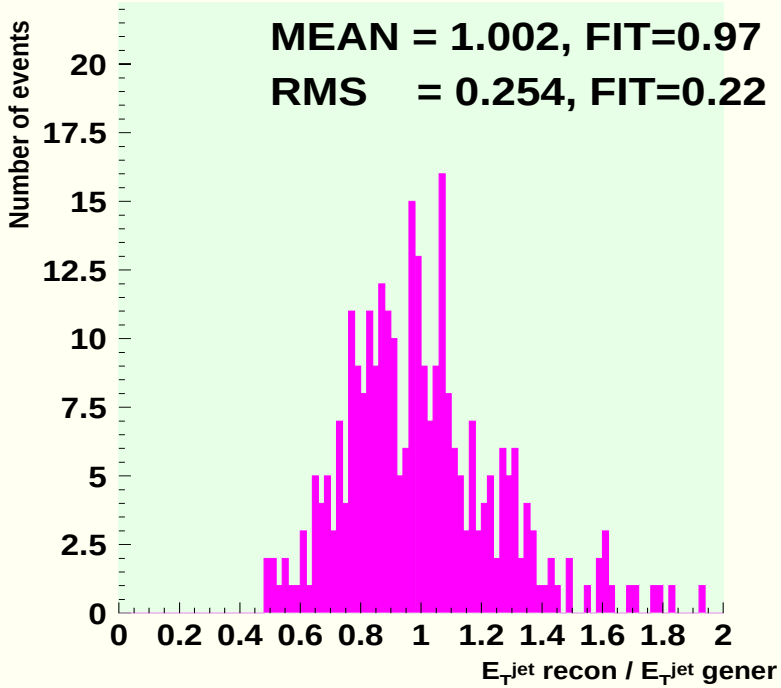
# $E_{rec}^{jet}/E_{gen}^{jet}$

**With coef.**




**With coef.**




**(Egen-Erec)/Erec 9.51%**

**0.053%**

**No significant jet energy resolution improvment (calculation with RMS and MEAN gives from 44% to 25% because of tails, calculations with FIT values gives 23% with and without coefficient)**

**Difference between mean energy of reconstructed jet and mean energy of generated jet is 0.053% for 18 GeV jets (instead of 9.2%) for cone 0.5.**